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Educational inequalities in life expectancy in German speaking part of Switzerland 1990-1997: Swiss National Cohort

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Abstract: STUDY OBJECTIVE: Switzerland belongs to the group of nations with the highest life expectancy. However, it is unclear to what extent life expectancy varies across socio-economic groups. We used data from a large longitudinal study to quantify differentials in life expectancy across educational groups for men and women of different ages. DESIGN: The Swiss National Cohort linked the records from the December 4th, 1990 census with death certificate data up to 1997, using a probabilistic record linkage method. The current analysis was restricted to Swiss nationals resident in the German speaking part of the country. Life expectancy was calculated for four educational categories ("compulsory schooling or less", "vocational training", "upper secondary education", "university education") by constructing abridged life tables for men and women aged 30 or older. RESULTS: The study was based on 3.06 million persons and 262,552 deaths recorded during 19.01 million person-years of follow up. The educational level was lower in women than in men. In most age groups vocational training was the dominant educational category. At ages 30, 50, 65 and 80 men with university education lived 7.1, 5.4, 3.5 and 1.6 years longer than their counterparts with compulsory education or less. In women the corresponding differences were 3.6, 3.1, 2.7 and 2.2 years. CONCLUSIONS: In Switzerland educational gradients in life expectancy are substantial, particularly among young and middle-aged men. Social policies and public health strategies should address this situation.

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Educational inequalities in life expectancy in the German speaking part of Switzerland between 1990 and 1997: Swiss National Cohort

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Summary

Study objective: Switzerland belongs to the group of nations with the highest life expectancy. However, it is unclear to what extent life expectancy varies across socio-economic groups. We used data from a large longitudinal study to quantify differentials in life expectancy across educational groups for men and women of different ages.

Design: The Swiss National Cohort linked the records from the December 4th, 1990 census with death certificate data up to 1997, using a probabilistic record linkage method. The current analysis was restricted to Swiss nationals resident in the German speaking part of the country. Life expectancy was calculated for four educational categories (“compulsory schooling or less”, “vocational training”, “upper secondary education”, “university education”) by constructing abridged life tables for men and women aged 30 or older.

Results: The study was based on 3.06 million

persons and 262,552 deaths recorded during 19.01 million person-years of follow up. The educational level was lower in women than in men. In most age groups vocational training was the dominant educational category. At ages 30, 50, 65 and 80 men with university education lived 7.1, 5.4, 3.5 and 1.6 years longer than their counterparts with compulsory education or less. In women the corresponding differences were 3.6, 3.1, 2.7 and 2.2 years.

Conclusions: In Switzerland educational gradients in life expectancy are substantial, particularly among young and middle-aged men. Social policies and public health strategies should address this situation.

Key words: census; cohort study; record linkage; education; inequality; life expectancy; socio-economic status; Switzerland

Introduction

Life expectancy is a widely used general measure of population health. Switzerland belongs to the group of nations with the highest life expectancy (77.9 years at birth in men and 83.0 years in women in 2003). Indeed, only people from Japan and Monaco live longer than the Swiss [1]. In industrialised countries life expectancy increased over the last 30 years [2], however, in Switzerland and elsewhere, mortality differentials exist between groups characterised by their socio-economic position [3–5].

Previous research on socio-economic inequalities in health in Switzerland focussed on mortality by occupation, based on cross-sectional data [6–8]. This work was not without limitations. For example, the cross-sectional nature of the data meant that results might have been affected by numerator/denominator bias because of a combina-

tion of two unlinked datasets. The information on the deceased (eg occupation, commune of residence) was derived from death certificates (numerator) and the information on the population at risk (denominator) came from the census. These two datasets did not describe the same population, ie did not apply the same definition of residency. Furthermore the census data were subjective whereas the information about the deceased came from local authorities or a physician. Occupational information from death certificates was used to describe the socio-economic position of individuals. This implied that those who did not work, such as older men and a substantial proportion of women, were excluded. For the present study we used data from the recently established longitudinal Swiss National Cohort [9]. The Swiss National Cohort consists of all persons with Swiss nationality living

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in Switzerland at the time of the 1990 Census. This population had been followed up till the end of 1997, based on the linkage of death certificates. In

this study we quantify differentials in life expectancy across educational groups for men and women of different ages.

Methods

The Swiss National Cohort is the first comprehensive longitudinal database in Switzerland. The Cohort is based on the 1990 census data and allows performing mortality analyses. We linked the anonymous records from the December 4th, 1990 census with the anonymous death certificate data registered between December 5th, 1990 and December 31st, 1997. All data were provided by the Swiss Federal Statistical Office. Because a unique numeric identifier is not available in Switzerland, a probabilistic record linkage method was used to identify the record in the census dataset corresponding to a specific death record. The linkage was based on five key variables (sex, date of birth, commune of residence, marital status, and religious denomination). As described in detail elsewhere [9, 10], different quality levels of linkage (strict, default, liberal) had been tested. For this study we agreed on the default level of linkage, which resulted in 86.6% of all death records linked to the census. For each 5-years-age-sex class we corrected for the proportion of the non-linked death records by multiplying the mortality rates by the reciprocal of the proportion of the linked. We restricted our analyses to Swiss nationals to avoid numerator/denominator

bias and migration effects [8, 10]. Furthermore, differences in the educational system between the linguistic areas of Switzerland and the proportions of successfully linked records led us to restrict the analysis to the German speaking part of the country (72% of the total population).

We grouped education into four categories: “compulsory schooling or less” (up to 9 years of education), “vocational training” (12 years), “upper secondary education” (13 to 16 years, including high school, teachers training colleges, technical colleges and upper vocational education) and “university education” (19 years or more). We included every subject who was at least 30 years old at the time of the census or reached age 30 till the end of 1997. We calculated mortality rates by education and sex for 5-year age groups from age 30. Life expectancy was calculated by constructing an abridged life table using Chiang’s methods [11]. The mortality of the last open-ended age interval (80 years and older) was estimated using a Gompertz model [12]. Life tables started at the age of 30: the expected years of additional life assumed survival to the age of 30.

Results

The study was based on the 3.06 million Swiss nationals living in the German speaking part of Switzerland in 1990 and 262,552 deaths recorded subsequently during 19.01 million person-years of follow up. Table 1 shows the distribution of the study population across educational groups, age and sex. The educational level was lower in women than in men. For example, among 30 to 39 year olds, the proportion of women in the lowest educational group (compulsory schooling or less) was 19.0% compared to 10.2% in men. There were also pronounced differences between birth cohorts. For example, in men aged 80 years or older between 1990 and 1997 the proportion with upper

secondary education was 8.8% compared to 21.6% in men aged 30 to 39 years. In most age groups vocational training was the dominant educational group.

We found that overall a man aged 30 could expect to live for an additional 46.7 years, and a woman of the same age for an additional 52.2 years (difference 5.5 years). Substantial differences were observed between educational groups (figure 1), with life expectancy increasing with additional education. At ages 30, 35, 40, 45, 50, 55, 60, 65, 70, 75 and 80 or older men with university education lived 7.1, 6.6, 6.3, 5.9, 5.4, 4.9, 4.2, 3.5, 2.8, 2.2 and 1.6 years longer than their counterparts with com-

Table 1

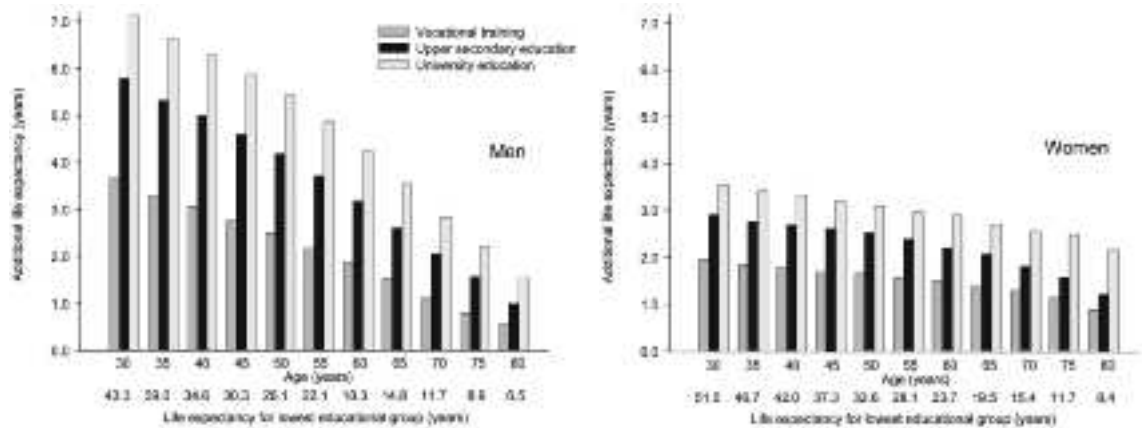
Distribution of population across age groups and educational classes, Swiss nationals living in German speaking Switzerland, 1990.

Educational class	Age groups (years)						
	30 to 39*	40 to 49	50 to 59	60 to 69	70 to 79	≥80	all ages
men	n = 544 375	n = 288 601	n = 214 346	n = 189 160	n = 127 045	n = 55 844	n = 1 419 371
University education	7.0%	9.4%	7.1%	6.6%	5.5%	4.7%	7.2%
Upper secondary education	21.6%	20.9%	17.5%	13.5%	10.7%	8.8%	18.3%
Vocational training	61.3%	56.8%	56.4%	50.5%	46.9%	44.9%	56.3%
Compulsory schooling	10.2%	12.9%	19.1%	29.3%	36.9%	41.6%	18.3%
Women	n = 561 163	n = 301 540	n = 242 867	n = 231 983	n = 179 726	n = 119 357	n = 1 636 636
University education	3.3%	2.8%	1.5%	1.1%	0.8%	0.6%	2.1%
Upper secondary education	14.6%	10.9%	7.5%	5.4%	4.4%	3.5%	9.6%
Vocational training	63.1%	56.1%	47.4%	37.5%	30.6%	24.7%	49.5%
Compulsory schooling	19.0%	30.2%	43.7%	55.9%	64.3%	71.2%	38.8%

* incl. all persons having reached the 30th birthday before January 1, 1998

Figure 1

Life expectancy by education and gender in Switzerland 1990–1997: differences in years between lowest and three higher categories.



pulsory education or less. In women the corresponding differences were 3.6, 3.4, 3.3, 3.2, 3.1, 3.0, 2.9, 2.7, 2.6, 2.5 and 2.2 years. Absolute differences thus decreased with increasing age, but in relative terms differences increased: the 7.1 years difference between highest and lowest educational group in men at age 30 corresponds to 16% of life expectancy in people with compulsory schooling

or less. In men aged 80 this had increased to 24%. Similarly, in women absolute differences declined with increasing age, but in relative terms differences increased from 6.9% to 25.6%. At age 30 life expectancy in men with a university education (50.4 years) was similar to the life expectancy of women with compulsory schooling (51.5 years).

Discussion

We found a consistent educational gradient in life expectancy in the German speaking part of Switzerland in the 1990s, both among men and women. Differences between educational groups were most pronounced among young men, and generally less important among women. With increasing age, differences represented an increasingly prominent proportion of the remaining life expectancy in people with low educational attainment.

To our knowledge this is the first analysis of social gradients in life expectancy in Switzerland. This study was made possible by the successful linkage of census and death certificate records within the framework of the Swiss National Cohort [9]. The population included both sexes and a wide range of age groups, including the elderly. Analyses were, however, restricted to the German speaking part of Switzerland, and although approximately 70% of Swiss nationals were included, findings may not be applicable to the French and Italian speaking regions of the country. For the record linkage we used the five key variables sex, date of birth, commune of residence, marital status and religious denomination. There was no information about education used for the linkage, as education was not available on the death records. Therefore we could not investigate differentials in the proportion of non-linked death records in relation to education. Our estimates assumed that the proportions were equal over the educational groups. Also, our analysis ignored quality of life and disability. Several studies showed that educational gradients in healthy life expectancy are likely

to be even more pronounced than those observed in our study [13–16].

Our study identified young and middle-aged men with low educational attainment as an important target group for interventions aimed at reducing inequalities in life expectancy. Prominent causes of death contributing to the educational mortality gradient in this age group include ischaemic heart disease and accidents, including alcohol related traffic accidents. This is compatible with the data on risk factors from the cross-sectional Swiss Health Survey: in men with lower education (but not in women) smoking, heavy alcohol consumption and obesity is more prevalent than in men with higher educational attainment [17].

International comparisons show that for men the Swiss gradient in mortality by education belongs to the steepest in Europe, whereas for women, gradients are comparable to other countries [18, 19]. Efforts to reduce social inequalities in health in Switzerland are hampered by a lack of awareness in the general public: the Swiss tend to be more concerned about differences between language regions and urban and rural areas than about socio-economic inequalities in health [3]. In the UK inequalities in health and wealth have been documented and discussed for many years, and policies aimed at reducing inequalities have been developed by the Labour government, although there is debate on what they have achieved [20]. By presenting differences in life expectancy, a metric familiar to the general public, we hope the present study will contribute to raising awareness and

stimulating debate in Switzerland. Our results are certainly relevant to the current debate on retirement age. We found substantial differences in life expectancy across educational groups at age 65, the usual retirement age in men. Our results support the notion that the age at retirement should be flexible and take life expectancy of different occupational groups into account. Of note, a retirement age of 60 years has recently been agreed for the Swiss construction sector.

In Switzerland the educational and social gradient in life expectancy is substantial among men in general, and particularly steep among younger

men. Clearly, debate on social policies and public health strategies is needed, and it will be important to monitor trends over time [21].

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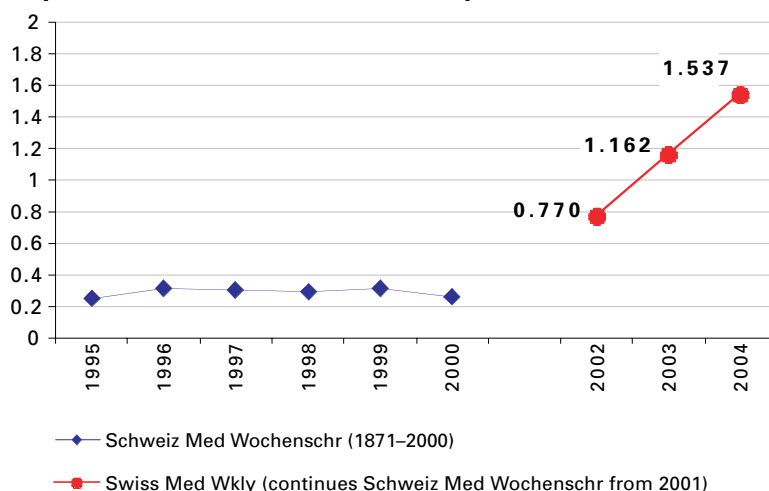
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